# Tapping into external R&D Resources: A Perspective

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**Display and Graphics Business Laboratory**
**St. Paul, MN, USA**

*** In collaboration with Dr. Robert Finocchiaro, Technical Director, Corporate R&D Services**

# Company Overview

- Founded in 1902
- Headquartered in St. Paul, MN
- Operations in over 60 countries
- Laboratory facilities in 35 countries
- Over 74,000 employees
- 55,000+ products

- Sales: $24.5 BB
- 63% of sales outside the US
- Net income: $4.1 BB
- R&D expenditures: 1.4 BB
- >2,000 patents issued WW (2009)

Six Market Leading Businesses (organically grown – not a conglomerate)


Consumer and Office | Display and Graphics | Electro and Communications | Safety, Security and Protection Services | Health Care | Industrial and Transportation

# Culture of Innovation

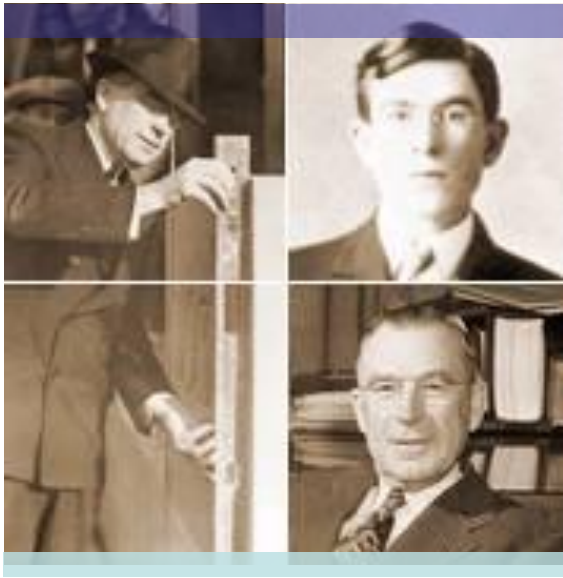
- 10,000+ technical employees around the world
- R&D at ~6% of sales
- Technical depth and breadth
- Bring multiple technologies to each customer
- Entrepreneurial culture
- Individual initiative ~15% time
- Legacy of boundaryless culture

# McKnight Principles

"As our business grows, it becomes increasingly necessary to **delegate responsibility** and to encourage men and women to exercise their initiative. This requires considerable tolerance. Those men and women … are going to want to do their jobs in their own way.

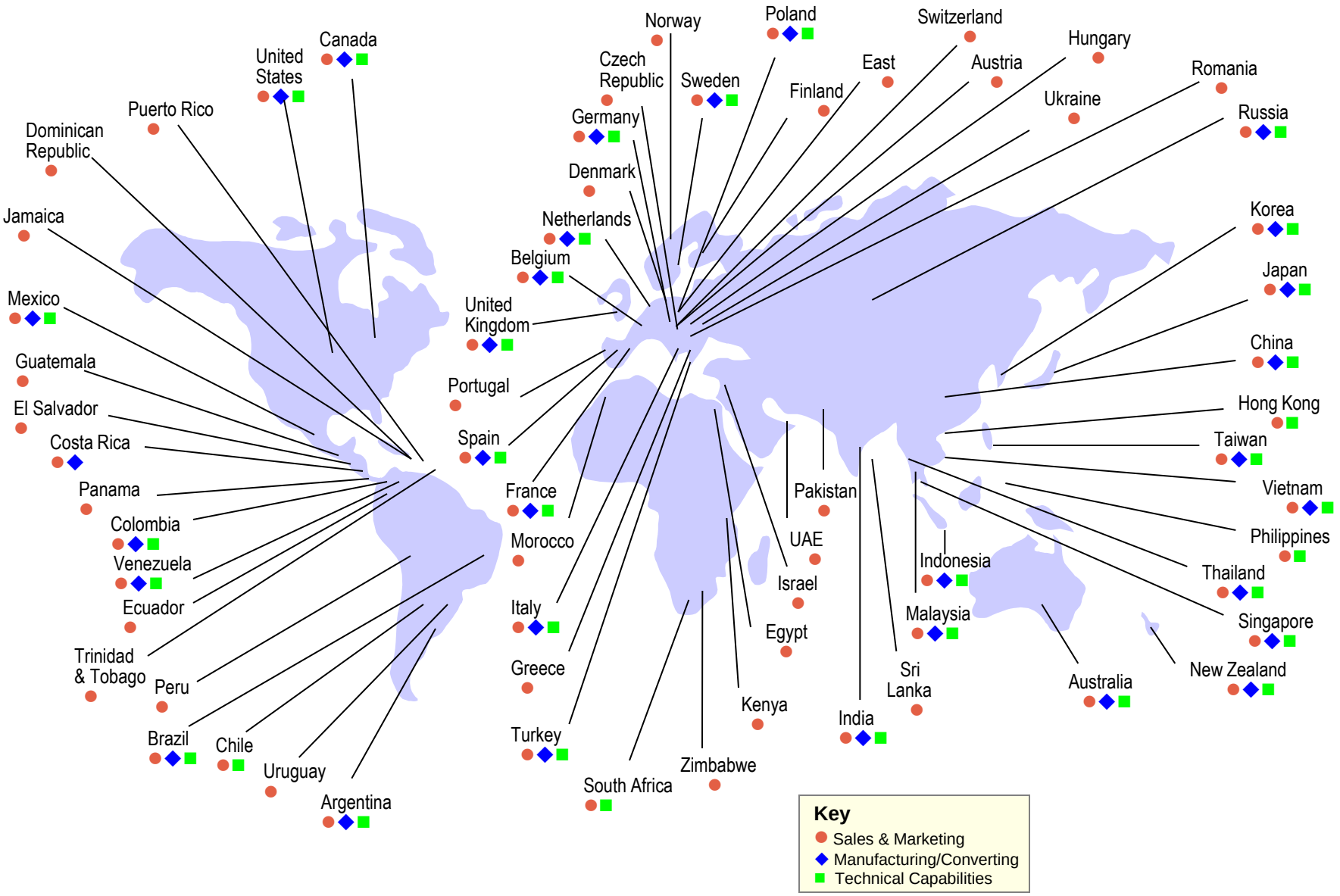
**Mistakes will be made.** But if a person is essentially right, the mistakes he or she makes are not as serious in the long run as the mistakes management will make if it undertakes to tell those in authority exactly how they must do their jobs.

Management that is destructively critical when mistakes are made kills initiative. **And it is essential that we have many people with initiative if we are to continue to grow.**"



- William McKnight, 1948

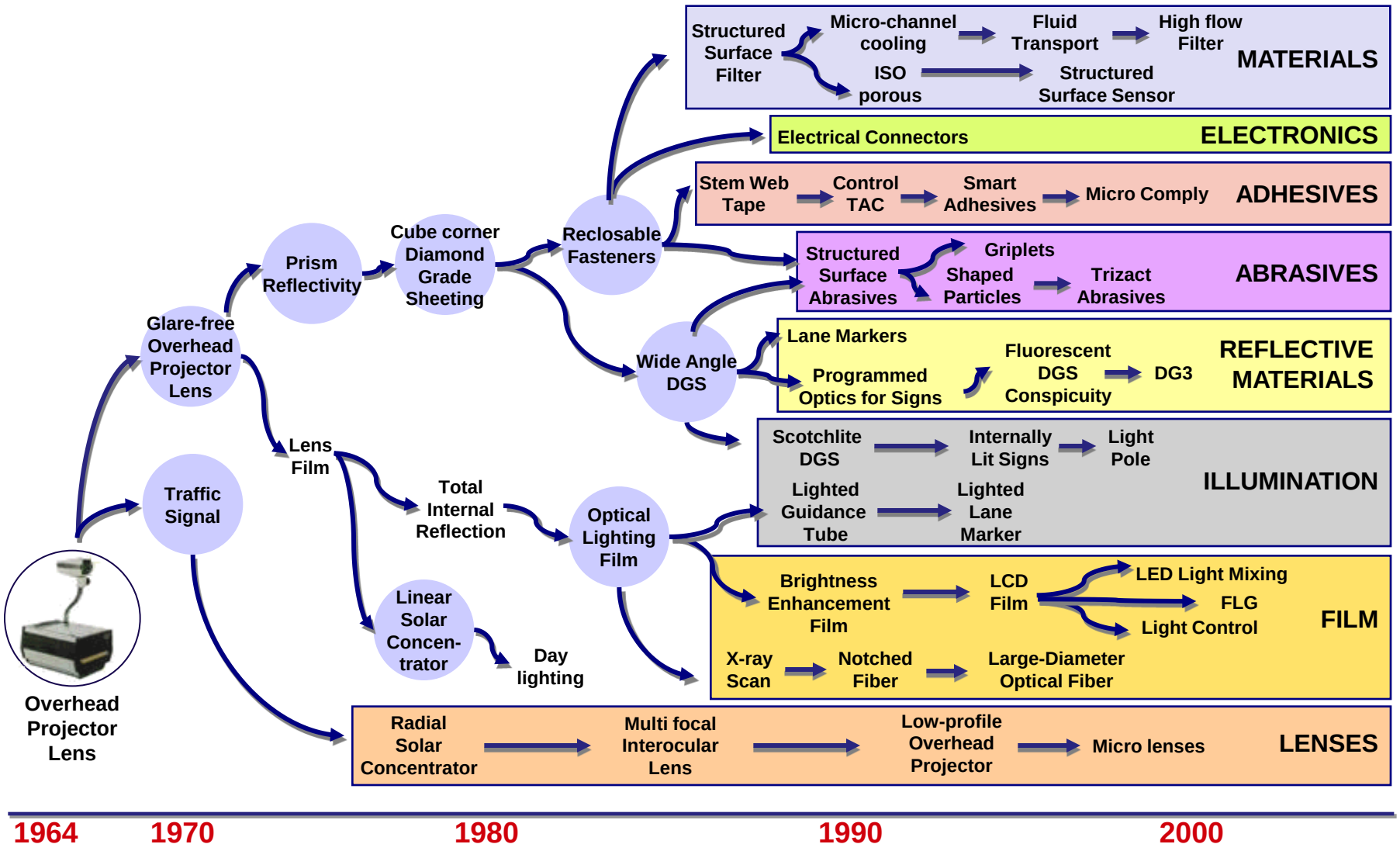
# is a Global Company



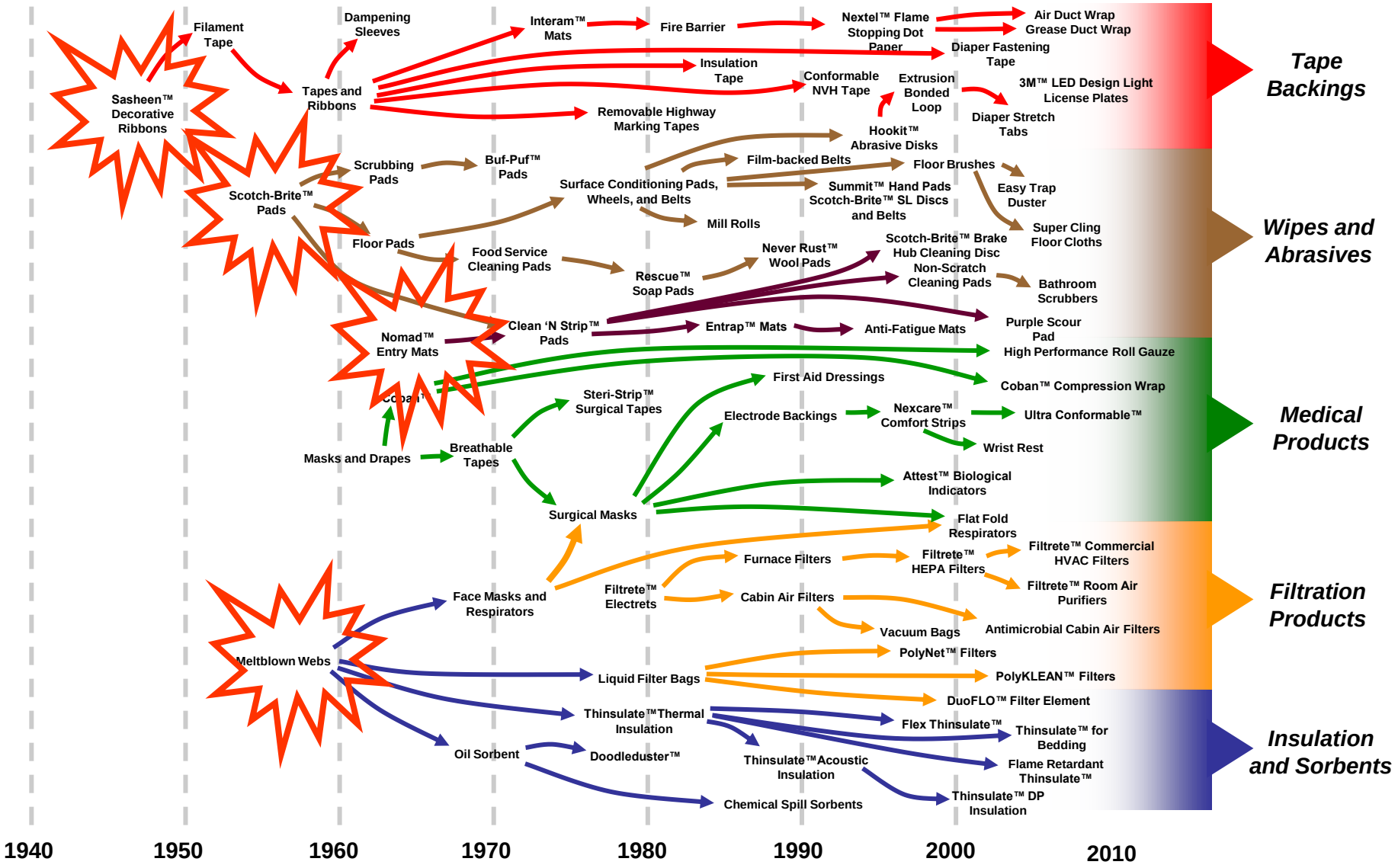
# Long and successful history of tapping into external R&D resources

- Historically, organic growth at 3M was enhanced by the selective technology acquisitions
- Early examples include:
  - Fluorochemicals
  - Microreplication
  - Non-woven
  - Multilayer films

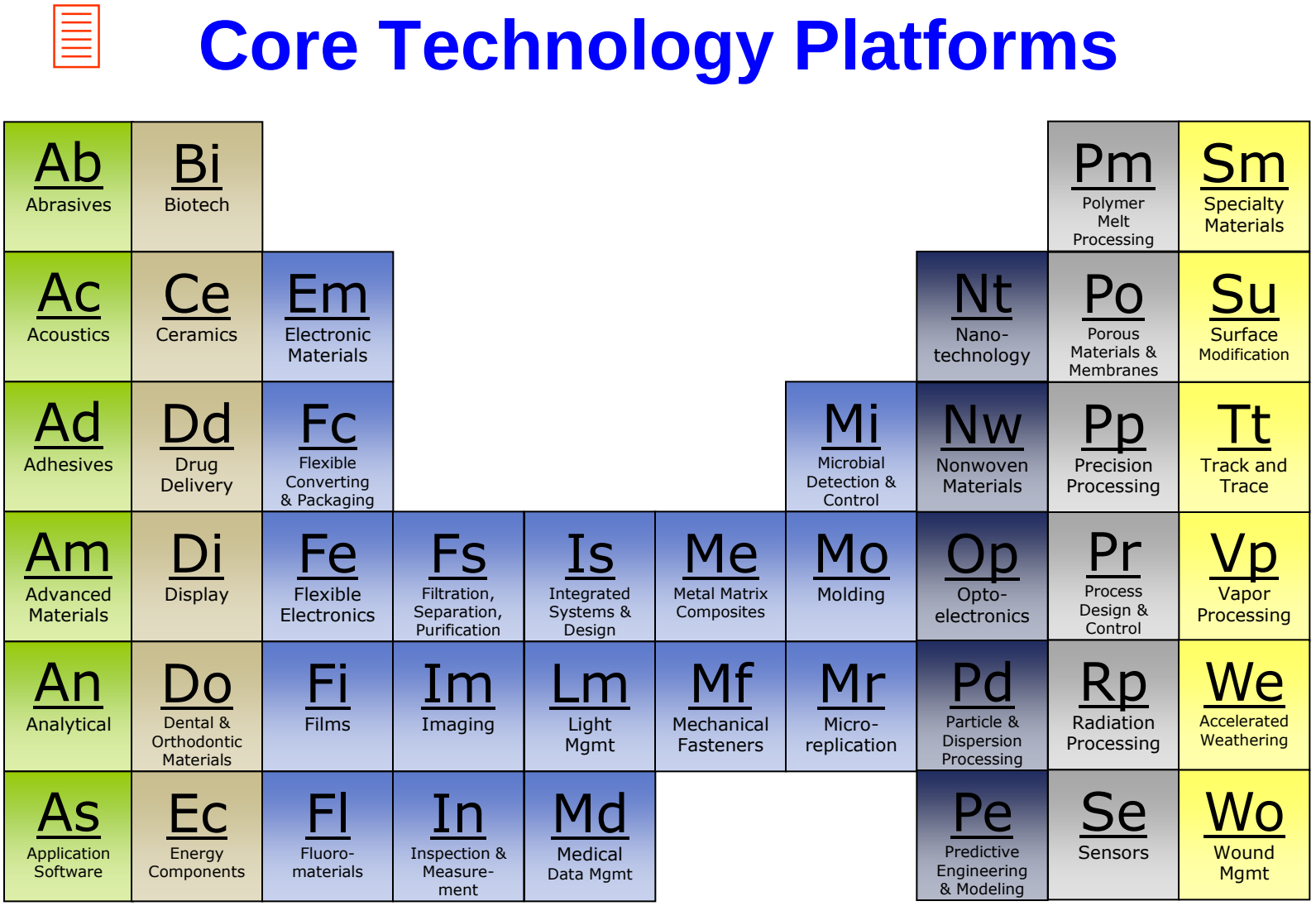
# Microreplication Technology



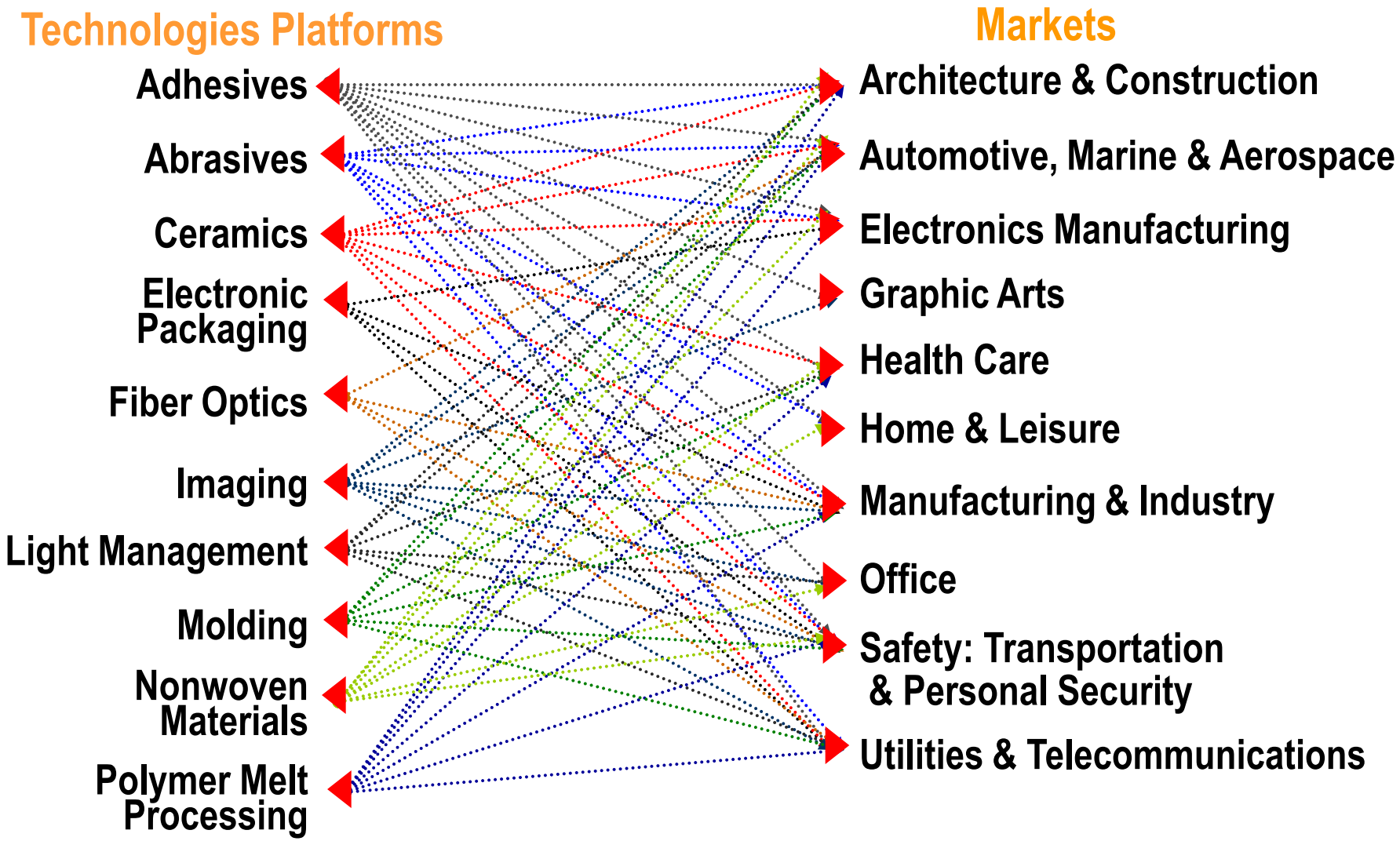
# Nonwovens Technology Platform



# Core Technology Platforms



# Technology Platforms…Multiple Markets



# Common factors of the past

- Early technology adoption
- Integration/cross-pollination
  - Branching
- IP coverage
- Branding
- Technologies primarily adopted for “internal consumption”

**Breadth of technology portfolio & success stories** **= risk of complacency**

# Recent industry trend: “Open Innovation”

- Internal and external ideas as inputs to the innovation process, combined with internal and external paths to markets
- Ideas come to the innovation process via
  - Internal research and external research
  - Licensing other companies’ technologies
  - Acquisition of other companies products

Adopted from HP presentation on Open Innovation and

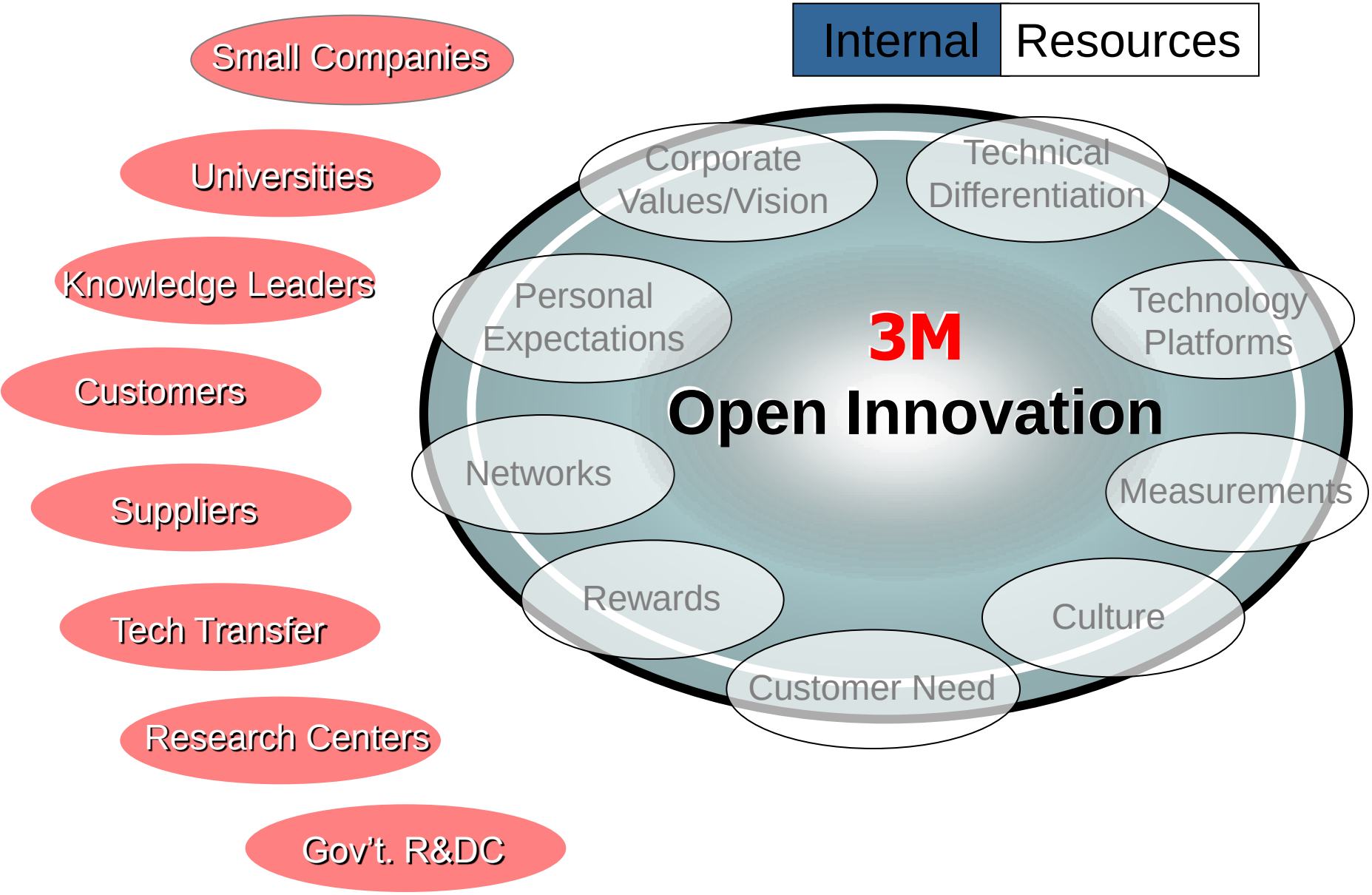
H. Chesbrough, Open business model, Harvard Business School Press, 2006

# Why Do Open Innovation at 3M?

- Drive Pipeline of Innovations
  - increase yield in R&D
- Identify New Categories of Business
  - support expansion into adjacencies and new categories
- Expand Reach
  - leverage a diverse portfolio of ideas and technologies across scientific disciplines and industries
- Reduce Risk in Decision-Making
  - combine internal knowledge with real-time intelligence from the global research and innovation community
- Achieve Financial Results
  - accelerate top-line growth by bringing new innovations to market faster

External Resources

Internal Resources



# Internal R&D is now obsolete?
# NO!

- Internal R&D increases awareness and recognition of surrounding external knowledge
- It identifies gaps and holes (which can then be filled by internal R&D, or sourced outside)
- It enables integration of individual pieces into a larger whole (systems perspective)

Adopted H. Chesbrough's presentation, 2008

R&D buy-in needed!

# Open Innovation

- Conditions that supported the transition from Closed to Open
  - Increased availability of quality technical talent globally
  - Increased mobility of talent across geographies and firms
  - The increasing number of firms developing new products and services
  - Pressure exerted by the globalization
- Adoption is driven by R&D management or business strategy
- While external ideas help create value, it takes internal R&D to claim a portion of that value (legally and with legal protection)
- Companies should expand the role of R&D to include not only knowledge generation, but also knowledge brokering.

Adopted H. Chesbrough's presentation, 2008

“Our R&D scientists are bright, curious people who are ready to tackle and solve any problem… But in today’s world we need to move so fast that it sometimes makes more sense to find the answers outside of 3M. …

It is a flatter world and education is more broadly distributed.  There are small, startup companies, young entrepreneurs and ever-more-sophisticated universities all over the world that are producing an increasing amount of invention and valuable knowledge. The amount of useful information being generated outside of 3M is on the rise and we want access to it.”

*Chuck Boeder, SS&PS R&D VP, 3M Company*

# How can organizations gain access to external R&D resources?

- Relationships with academic researchers and institutions
  - Academic and business motivations differ
- Participating in Collaborative Research Initiatives
  - IMEC: IP helps syndicate research
  - Fraunhofer, SRI: Research as a business
    - WRC EIT+ (?)
- Innovation intermediaries

Adopted from H. Chesbrough, 2008

# Innovation intermediaries

- InnoCentive – Through “Solver” network matches solutions to problems. Primarily synthesis and manufacturing problems, moving toward applications. IP rights belong to Seeker.
- NineSigma - Uses Program Managers to craft RFPs working with your staff. Matches to solution providers through their network. IP is TBD.
- Big Idea Group – Agent/cod developer
- InnovationXchange - Broker
- Shanghai Silicon IP Exchange - Broker
- Ocean Tomo – Market maker
- Yet2 – Broker bringing IP buyers and sellers together

Adopted from: H. Chesbrough, Open Business Models

# Open Innovation Process at 3M

- How to select the best opportunities?
  - Myriad of project attributes (financial, strategic …)
- Do we know what we don't know?
  - Global company: 35 labs in different countries
- Do we have skin in the game?
  - Technical community needed to support effort

# Project Selection

- Key Criteria
  - Financial impact
  - Skill sets required
  - Alignment with objectives
  - Probability of success
  - Potential for competitive advantage
  - Potential reach
  - Intellectual property considerations

# Academic interactions

- > 150 non-tenure faculty grants over the last 5 years (US only)
- Multilateral projects

  (involving governmental agencies, research institutes, small companies)
  - Fuel cells
  - Renewable energy
  - Lithium-ion batteries
  - Personal safety protection

# The use of Innovation Intermediaries

- Successful recent examples:
  - Extreme refractive index materials
  - Transparent conductors
  - Hand-held luminometer

# Key Learnings When Doing Open Innovation

- Strategic Value
- Dedicated Resources
- Champion
- Intellectual Property